

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Pactola Reservoir, Pennington County**  
**RAP-Lake-1-000**  
**2018**

**Lake Information**

**Name:** Pactola Reservoir  
**County:** Pennington  
**Surface Area:** 825 Acres

**Surveys and Investigations**

Survey methods used by gear type, date, and effort.

Gear	Date	Effort
AFS std gill net	Jul 17, 2018	8 net-nights
AFS std gill net	Jul 18, 2018	8 net-nights
AFS std gill net	Jul 19, 2018	8 net-nights
frame net (std 3/4 in)	Jun 04, 2018	8 net-nights

## **Common Fish Species Present**

Lake Trout

Brown Trout

Rainbow Trout

Bluegill

Rock Bass

Bluegill X Gr. Sunfish Hybrid

White Sucker

Northern Pike

Rudd

Yellow Perch

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## Terminology

Catch per unit effort (**CPUE**) refers to the relative abundance of a species. It is defined as the number of fish captured per unit of effort (i.e., number of fish captured per net-night or number of fish captured per hour electrofishing). In this report CPUE is typically given for only stock-length fish (see length categories table for stock lengths).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.
- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.
- **std experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

$$CPUE = \frac{\text{number of fish}}{\text{effort}}$$

Population size structure is quantified using the indices proportional size distribution of quality-length fish (**PSD**) and proportional size distribution of preferred-length fish (**PSD-P**). These indices indicate the proportion of stock-length fish that are equal to or greater than a given length. Minimum lengths for stock, quality and preferred length fish are given in the length categories table.

$$PSD = \left( \frac{\text{number of fish} \geq \text{quality length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

$$PSD - P = \left( \frac{\text{number of fish} \geq \text{preferred length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

Relative weight (**Wr**) is used to quantify fish plumpness. Relative weight is the ratio of what a fish weighs (*W*) compared to a length-specific standard weight (*Ws*) multiplied by 100. Relative weight values of 95-105 are commonly cited as optimum values, but values in the 80s are common during summer sampling in South Dakota.

$$Wr = \left( \frac{W}{W_s} \right) \times 100$$

Confidence intervals (CI) are provided for many of the estimates calculated in this report. The confidence interval provides a range in which the true mean is expected to fall. For example, with an 80% CI we are 80% confident that the interval contains the true value.

Length categories include stock (S), quality (Q), preferred (P), memorable (M) and trophy (T). Length categories for most species have been defined based on a percentage of the world record length for that species. Some species mentioned in this report do not have defined length categories. Length categories for species used in this report are provided in the following table. Measurements are the minimum total length for each category and are reported in inches (in) and centimeters (cm).

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38
Bluegill	3	8	6	15	8	20	10	25	12	30
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
Walleye	10	25	15	38	20	51	25	63	30	76
White Bass	6	15	9	23	12	30	15	38	18	46
White Crappie	5	13	8	20	10	25	12	30	15	38
Yellow Bullhead	4	10	7	18	9	23	11	28	14	36
Yellow Perch	5	13	8	20	10	25	12	30	15	38

## Catch Summary of Stock Length Fish

Catch per unit effort (CPUE), proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) for species sampled in survey with 80% confidence interval (CI-80).

\* **Methods/Species that ignore stock length**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Bluegill	2	0.1	0.1	100		0		92	0
	Brown Trout	23	1.0	0.4	91		22	14	79	3
	Lake Trout	65	2.7	0.7	88	6	17	7	83	4
	Northern Pike	7	0.3	0.2	71		29		92	3
	Rainbow Smelt	2	0.0	0.0						
	Rainbow Trout	7	0.3	0.2	71		0		81	4
	White Sucker	20	0.8	0.4	100		100		100	2
	Yellow Perch	5	0.2	0.1	20		0		87	4
frame net (std 3/4 in)	Bluegill	197	24.6	12.3	90	3	11	3	97	1
	Bluegill X Gr. Sunfish Hybrid	20	2.5	1.7	90		10			
	Largemouth Bass	1	0.1	0.2	0		0		107	
	Northern Pike	3	0.4	0.3	67		0		105	6
	Rainbow Trout	3	0.4	0.4	33		0		70	7
	Rock Bass	182	22.5	7.9	48	5	15	4	105	1
	Rudd	2	0.3	0.4	100		100			
Yellow Perch	2	0.3	0.4	100		0		81	2	



## 10-Year Catch Per Unit Effort by Gear and Species

Catch per unit effort (CPUE) and average (Avg) of species across 10 years using different gear types.

Gear	Species	CPUE										Avg
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AFS std gill net	Bluegill										0.1	0.1
	Brown Trout										1.0	1.0
	Lake Trout										2.7	2.7
	Northern Pike										0.3	0.3
	Rainbow Smelt										0.0	0.0
	Rainbow Trout										0.3	0.3
	White Sucker										0.8	0.8
	Yellow Perch										0.2	0.2
frame net (std 3/4 in)	Black Crappie			2.6			2.1		0.3			1.7
	Bluegill			32.9	30.3	31.0	20.6		61.5		24.6	33.5
	Bluegill X Gr. Sunfish Hybrid								7.3		2.5	4.9
	Golden Shiner			0.0	0.0							0.0
	Green Sunfish					0.3	0.9					0.6
	Largemouth Bass			0.0	0.3	0.1	0.0		0.1		0.1	0.1
	Northern Pike					0.1	0.1		0.4		0.4	0.3
	Rainbow Smelt			0.0								0.0
	Rainbow Trout			0.4	0.1	0.1	0.1				0.4	0.2
	Rock Bass			6.6	15.5	13.4	31.6		22.1		22.5	18.6
	Rudd					3.0	2.9				0.3	2.1
	White Sucker			4.8	0.4	0.1	0.1					1.4
	Yellow Perch			1.6	5.8	0.5	0.9		0.4		0.3	1.6
	std exp gill net	Bluegill	2.6	6.1	2.5	6.7	2.5	6.0		4.0		
Brown Trout		1.9	2.4	2.1	1.8	0.9	0.2		1.1			1.5
Golden Shiner		0.0	0.0	0.0	0.0							0.0
Lake Trout		1.8	3.1	2.2	2.3	3.0	3.1		3.0			2.6
Largemouth Bass		0.2	0.0	0.0								0.1
Northern Pike		0.4	0.7	1.1	0.9	0.3	0.5		0.5			0.6
Rainbow Smelt		0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0
Rainbow Trout		0.2	1.2	0.8	2.8	1.0	1.5		0.2			1.1
Rock Bass		0.1	0.8	0.8	0.6	0.3	1.3		1.5			0.8
Rudd						0.1						0.1
Sunfish/Crappie/Rock Bass			0.0									0.0
White Sucker		0.7	0.6	0.5	0.9	0.3	0.3		0.2			0.5
Yellow Perch		0.3	3.0	7.5	2.6	1.0	4.6		0.2			2.7





## 10-Year Size Structure and Condition Statistics by Gear and Species

Species proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) collected by different gear types across 10 years.

Gear	Species	Index	Year												
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018			
AFS std gill net	Bluegill	PSD													100
		PSD-P													0
		Wr													92
	Brown Trout	PSD													91
		PSD-P													22
		Wr													79
	Lake Trout	PSD													88
		PSD-P													17
		Wr													83
	Northern Pike	PSD													71
		PSD-P													29
		Wr													92
	Rainbow Trout	PSD													71
		PSD-P													0
		Wr													81
	White Sucker	PSD													100
		PSD-P													100
		Wr													100
Yellow Perch	PSD													20	
	PSD-P													0	
	Wr													87	
frame net (std 3/4 in)	Bluegill	PSD			81	48	38	58			34			90	
		PSD-P			15	5	1	10			0			11	
		Wr			89	90	95	90			98			97	
	Northern Pike	PSD					100	100			0			67	
		PSD-P					0	100			0			0	
		Wr					99	119			84			105	
	Rainbow Trout	PSD			0	0	0	0						33	
		PSD-P			0	0	0	0						0	
		Wr				84	82							70	
	Rock Bass	PSD			8	18	25	51			45			48	
		PSD-P			2	3	7	13			7			15	
		Wr				87	92	97			89			105	

Gear	Species	Index	Year										
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
frame net (std 3/4 in)	White Sucker	PSD			100	100	100	100					
		PSD-P			100	100	100	100					
		Wr				85	76	87					
	Yellow Perch	PSD			0	11	0	57		100		100	
		PSD-P			0	4	0	0		0		0	
		Wr				78	75	98		84		81	
	std exp gill net	Bluegill	PSD	81	12	17	14	73	78		52		
			PSD-P	10	0	0	1	0	0		0		
			Wr	90	96	91	89	91	95		93		
Brown Trout		PSD	74	86	88	82	55	0		23			
		PSD-P	4	3	4	14	0	0		0			
		Wr	77	76	70	80	77	81		76			
Lake Trout		PSD	5	24	23	48	64	32		17			
		PSD-P	0	0	4	4	11	8		6			
		Wr	86	87	83	93	92	87		89			
Northern Pike		PSD	60	50	77	82	33	100		67			
		PSD-P	40	13	31	45	0	33		50			
		Wr	86	88	95	100	83	116		109			
Rainbow Trout		PSD	0	0	10	0	0	0		0			
		PSD-P	0	0	0	0	0	0		0			
		Wr	77	78	73	77	76	79		71			
Rock Bass		PSD	100	0	0	0	25	33		39			
		PSD-P	100	0	0	0	0	0		22			
		Wr	86	96	77	88	89	97		84			
White Sucker		PSD	100	100	100	100	100	100		100			
		PSD-P	100	100	100	100	100	100		100			
		Wr	87	78	75	88	88	95		92			
Yellow Perch		PSD	0	31	8	0	67	13		0			
		PSD-P	0	3	1	0	25	0		0			
		Wr	96	89	73	89	90	95		86			

## Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Lake Trout

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	53				384 (1)	398 (1)	513 (8)	544 (14)	551 (12)	573 (8)	617 (10)

## Fish Condition

Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

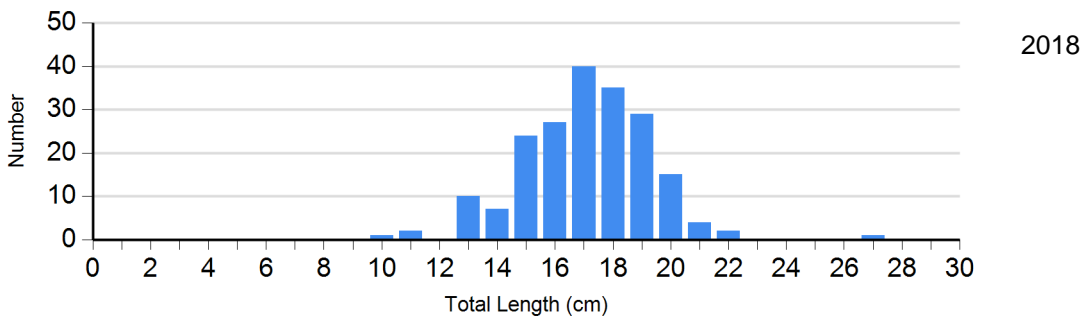
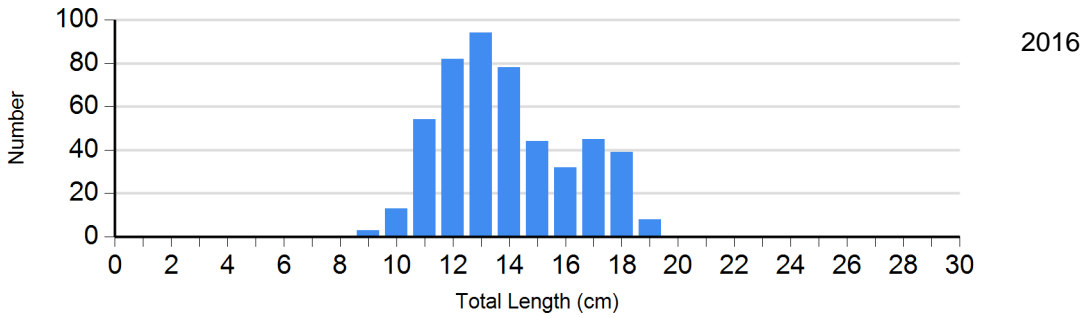
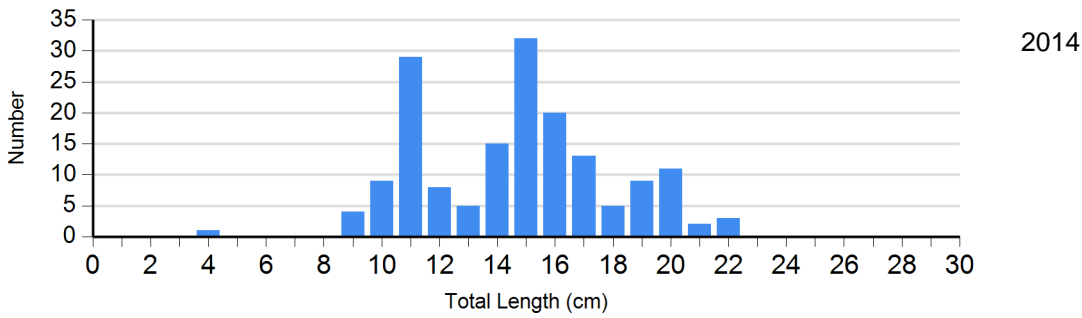
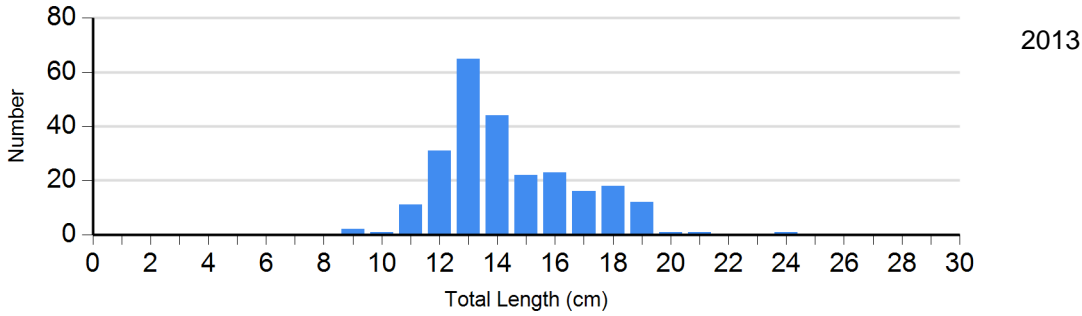
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Bluegill Frame Net	2014	70	91 (3.1)	79	89 (1.3)	16	91 (1.7)	0	
	2016	324	100 (1.4)	168	94 (0.9)	0		0	
	2018	20	97 (2.7)	155	98 (0.7)	21	92 (3.8)	1	22
Brown Trout Gill Net	2014	2	81 (3.7)	0		0		0	
	2016	10	77 (2.3)	3	70 (8.3)	0		0	
	2018	2	81 (11.2)	16	76 (1.7)	5	88 (5.0)	0	
Lake Trout Gill Net	2014	25	87 (2.1)	9	87 (4.4)	3	86 (4.5)	0	
	2016	30	88 (2.0)	4	89 (0.3)	1	108	1	
	2018	8	86 (3.5)	46	82 (3.6)	8	98 (3.9)	3	
Northern Pike Gill Net	2014	0		4	108 (6.7)	0		2	132 (1.9)
	2016	2	90 (4.4)	1	119	2	126 (9.1)	1	102
	2018	2	95 (2.8)	3	90 (4.2)	0		2	
Rainbow Trout Gill Net	2014	18	79 (1.6)	0		0		0	
	2016	2	71	0		0		0	
	2018	2	86 (8.7)	5	79 (3.2)	0		0	
White Sucker Gill Net	2014	0		0		0		4	95 (7.1)
	2016	0		0		0		2	92
	2018	0		0		0		20	100 (1.6)
Yellow Perch Gill Net	2014	48	97 (3.6)	7	87 (2.2)	0		0	
	2016	2	86 (12.0)	0		0		0	
	2018	4	88 (4.0)	1	85	0		0	

# Length Frequency Distribution

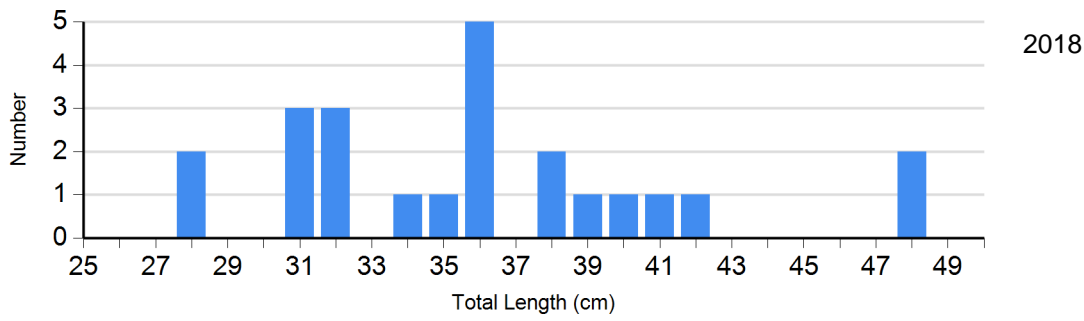
Length frequency histogram of species sampled by year.

Species: Bluegill

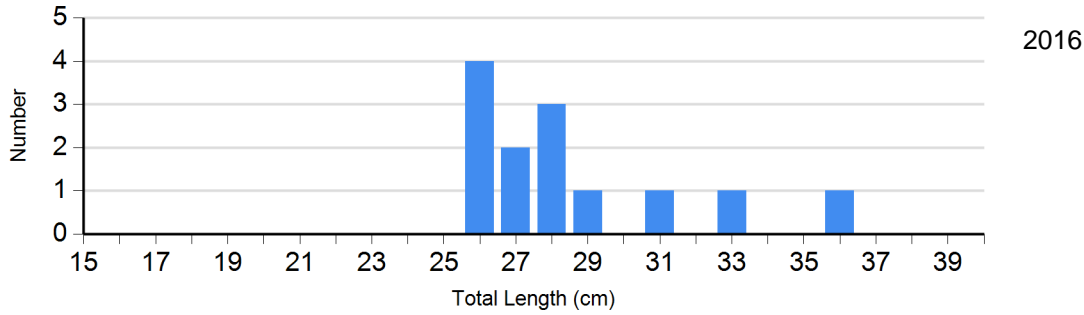
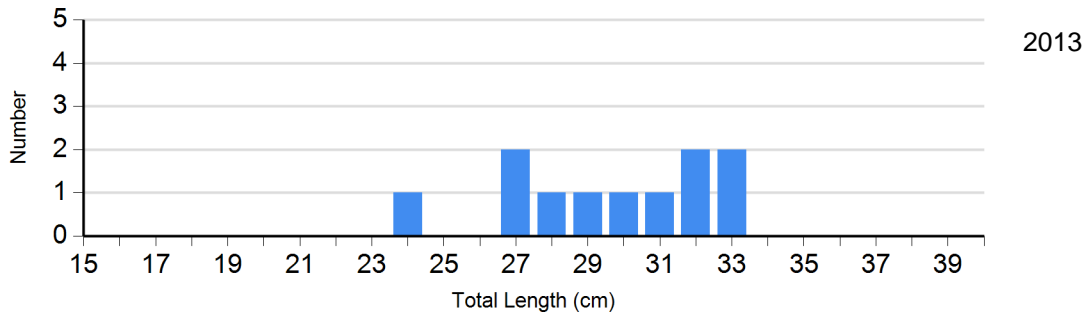
Gear: frame net (std 3/4 in)



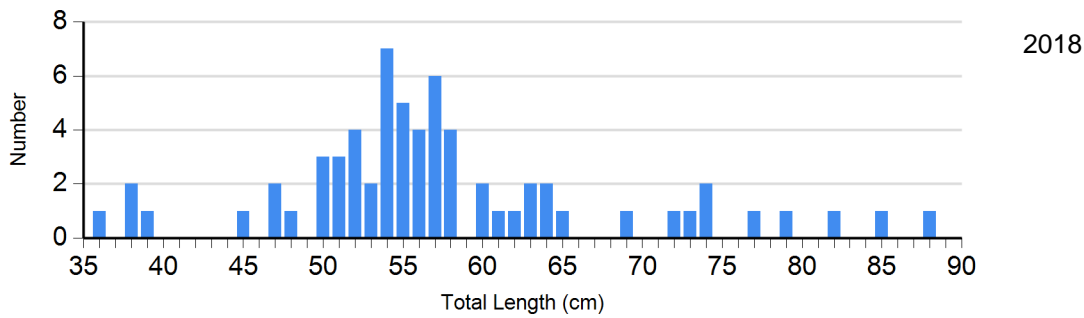
Species: Brown Trout  
Gear: AFS std gill net



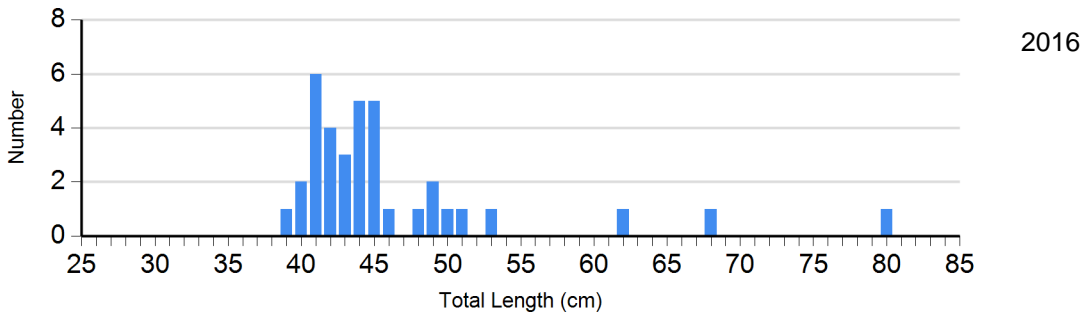
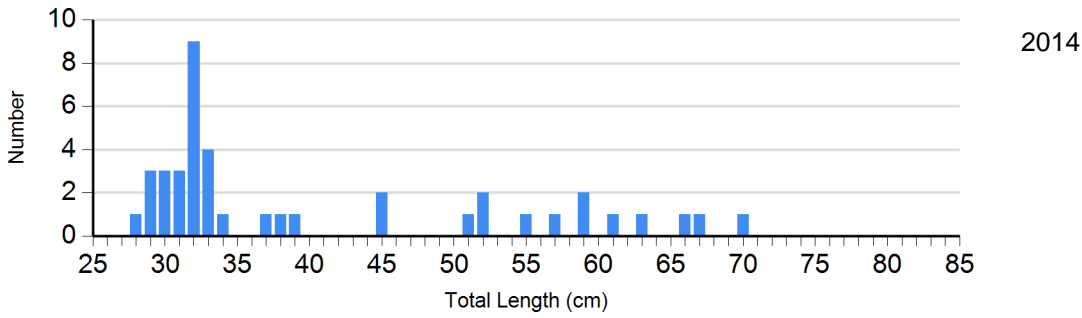
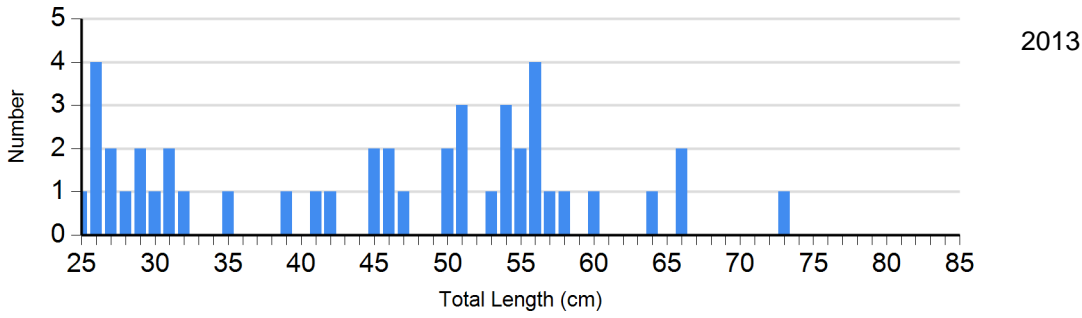
Species: Brown Trout  
Gear: std exp gill net



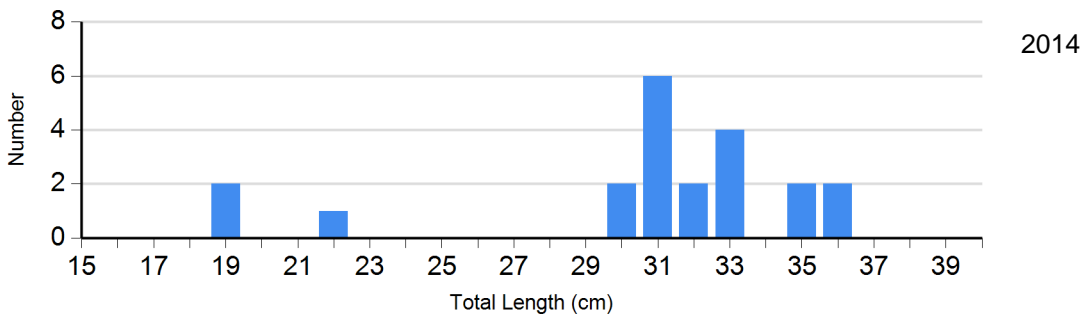
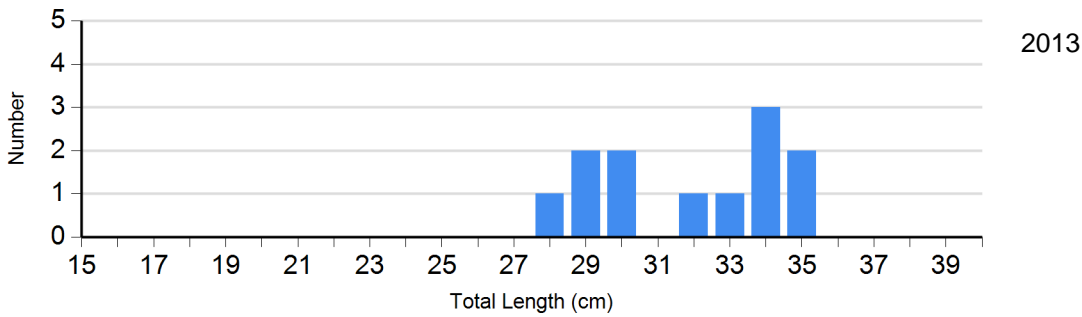
Species: Lake Trout  
Gear: AFS std gill net



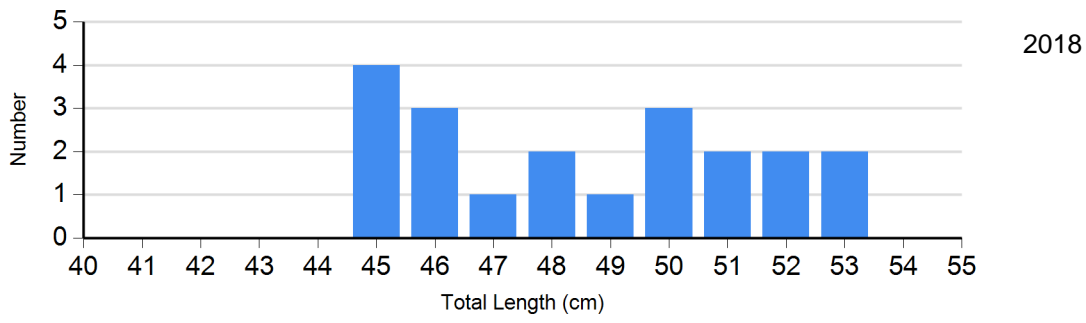
Species: Lake Trout  
 Gear: std exp gill net



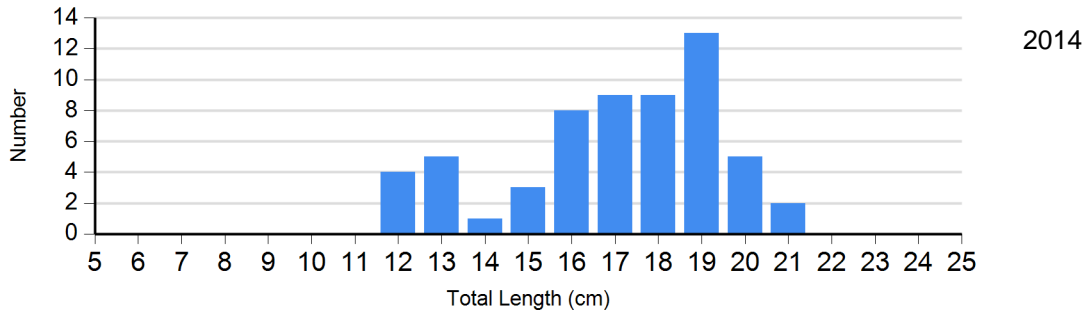
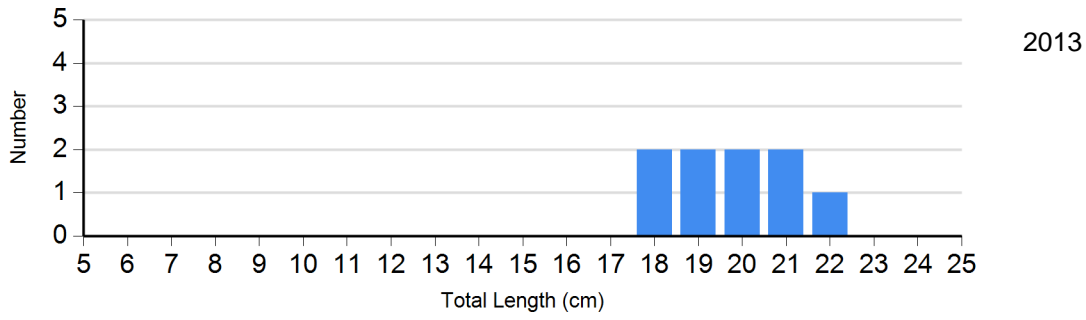
Species: Rainbow Trout  
 Gear: std exp gill net



Species: White Sucker  
Gear: AFS std gill net



Species: Yellow Perch  
Gear: std exp gill net



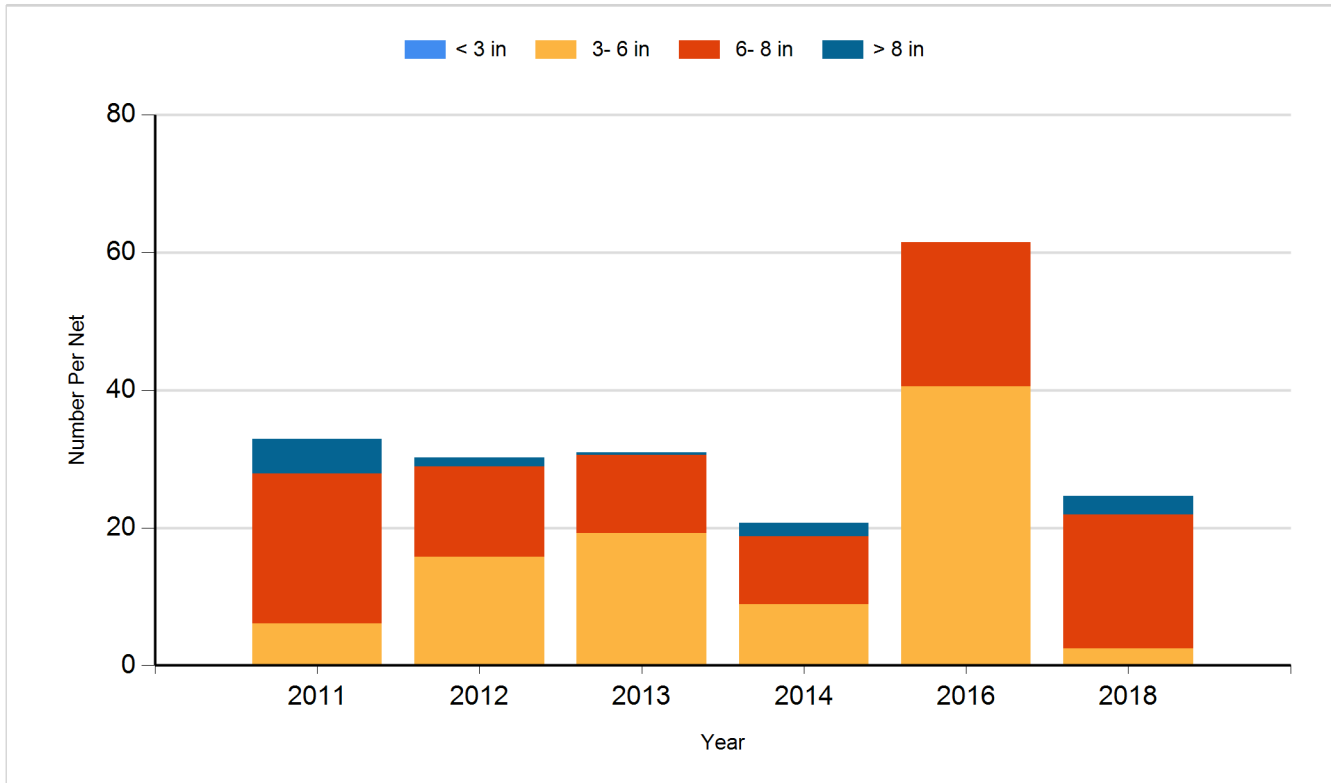


## Historic Fish Sizes and Relative Abundance

Size distribution per net by color for species sampled by year.

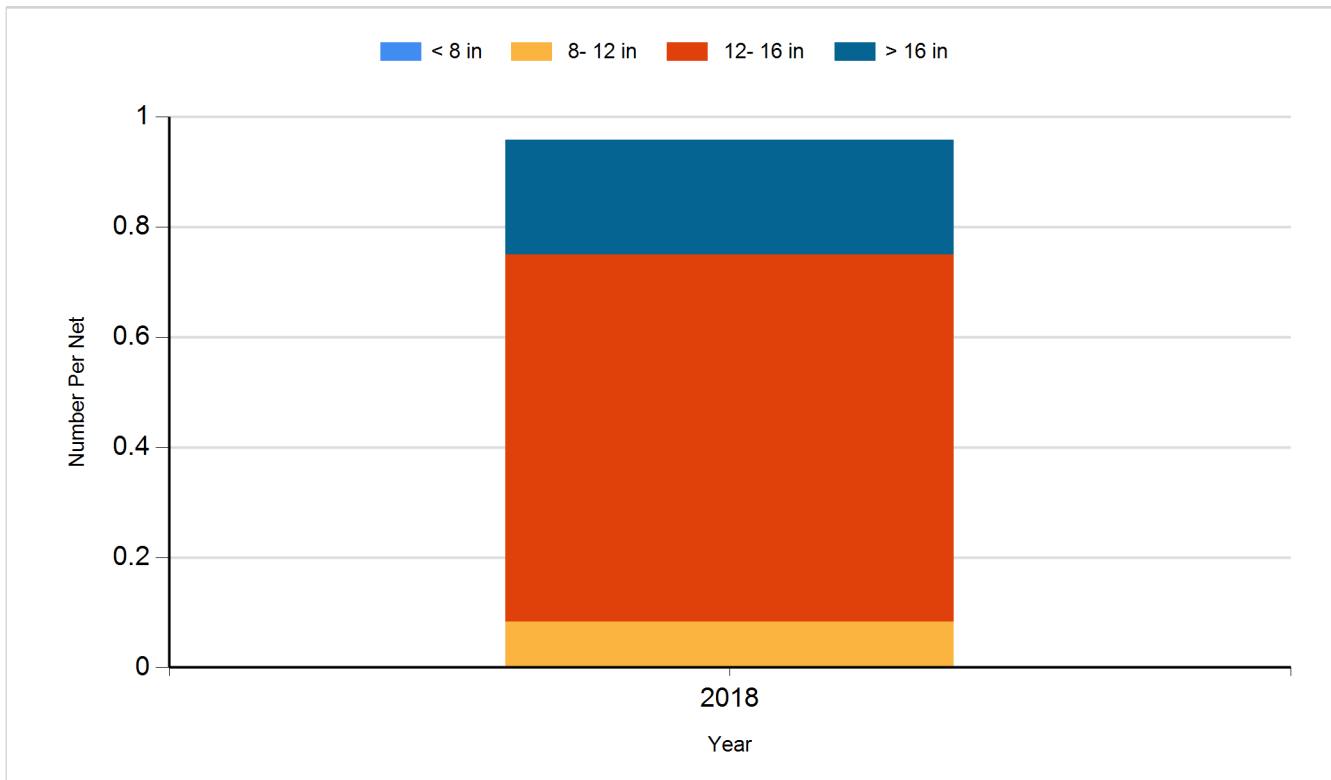
Species: Bluegill

Gear: frame net (std 3/4 in)

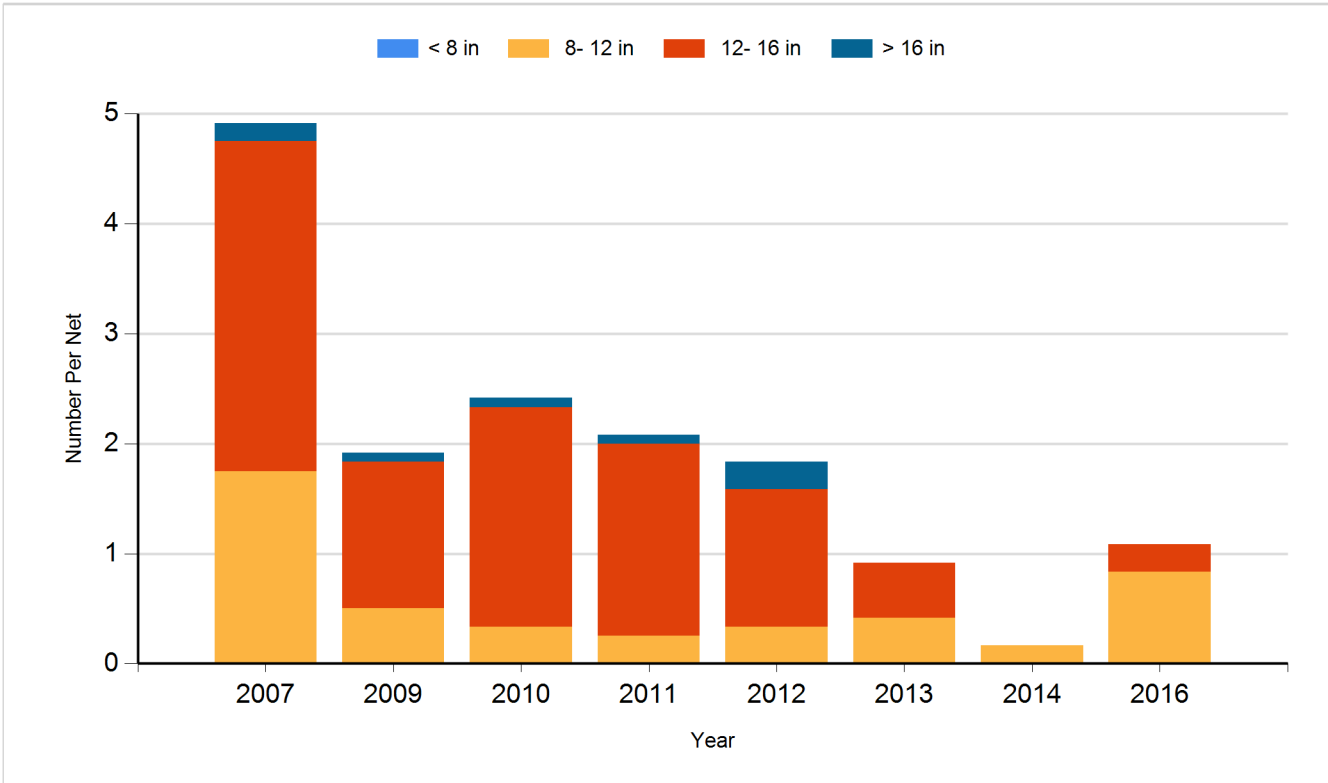


Species: Brown Trout

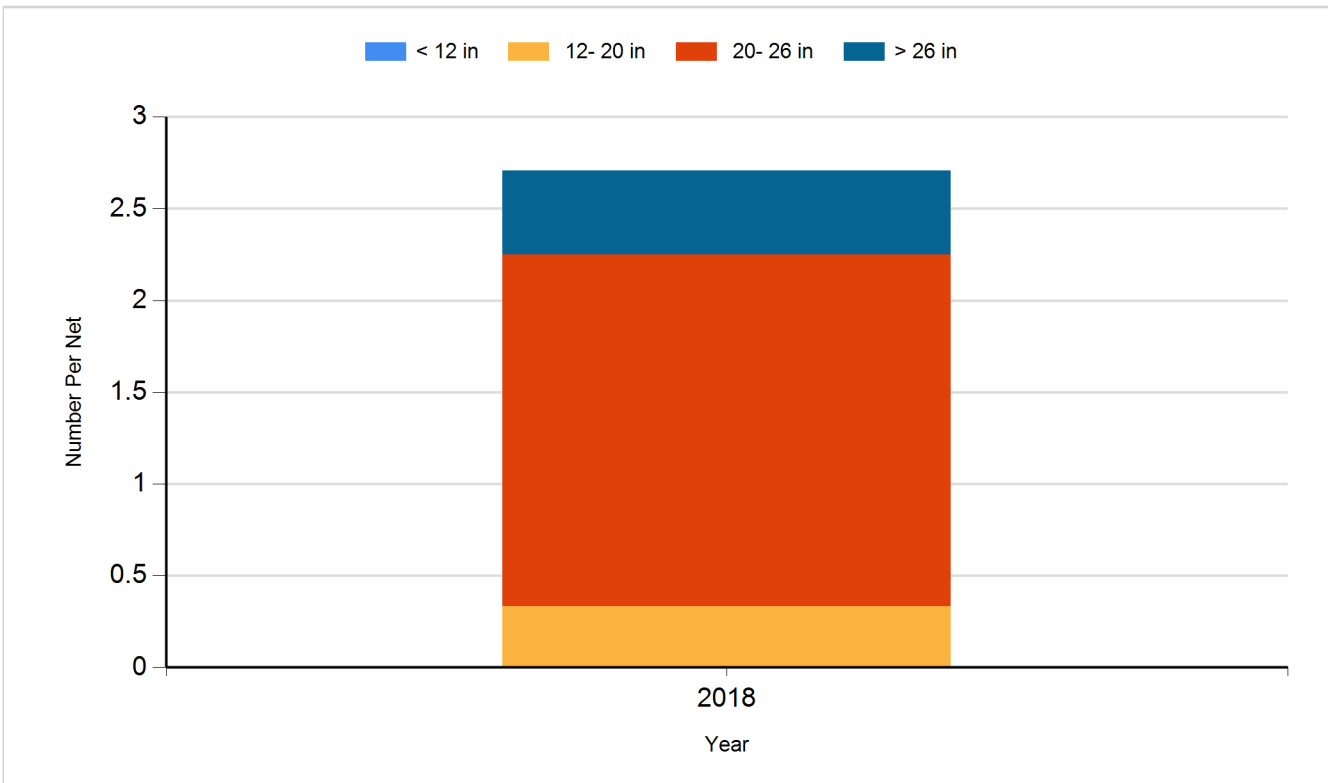
Gear: AFS std gill net



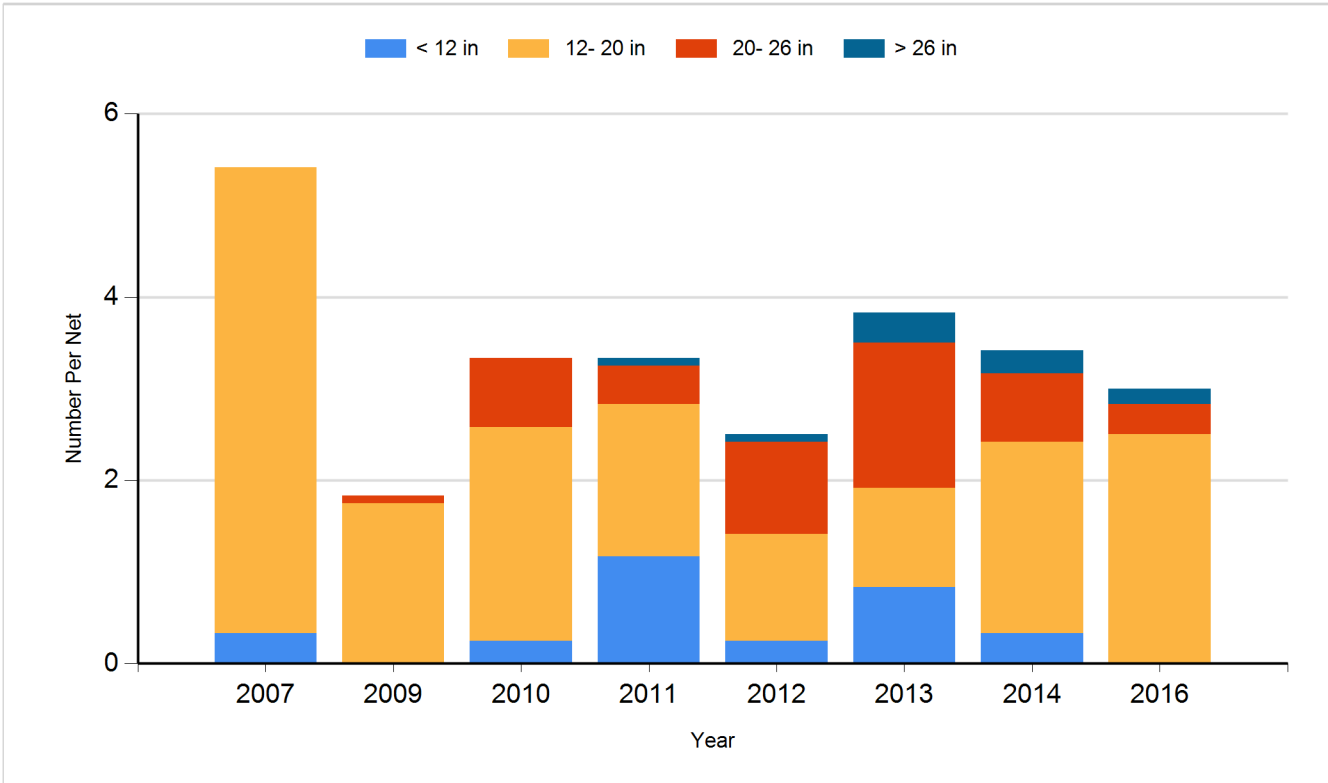
Species: Brown Trout  
Gear: std exp gill net



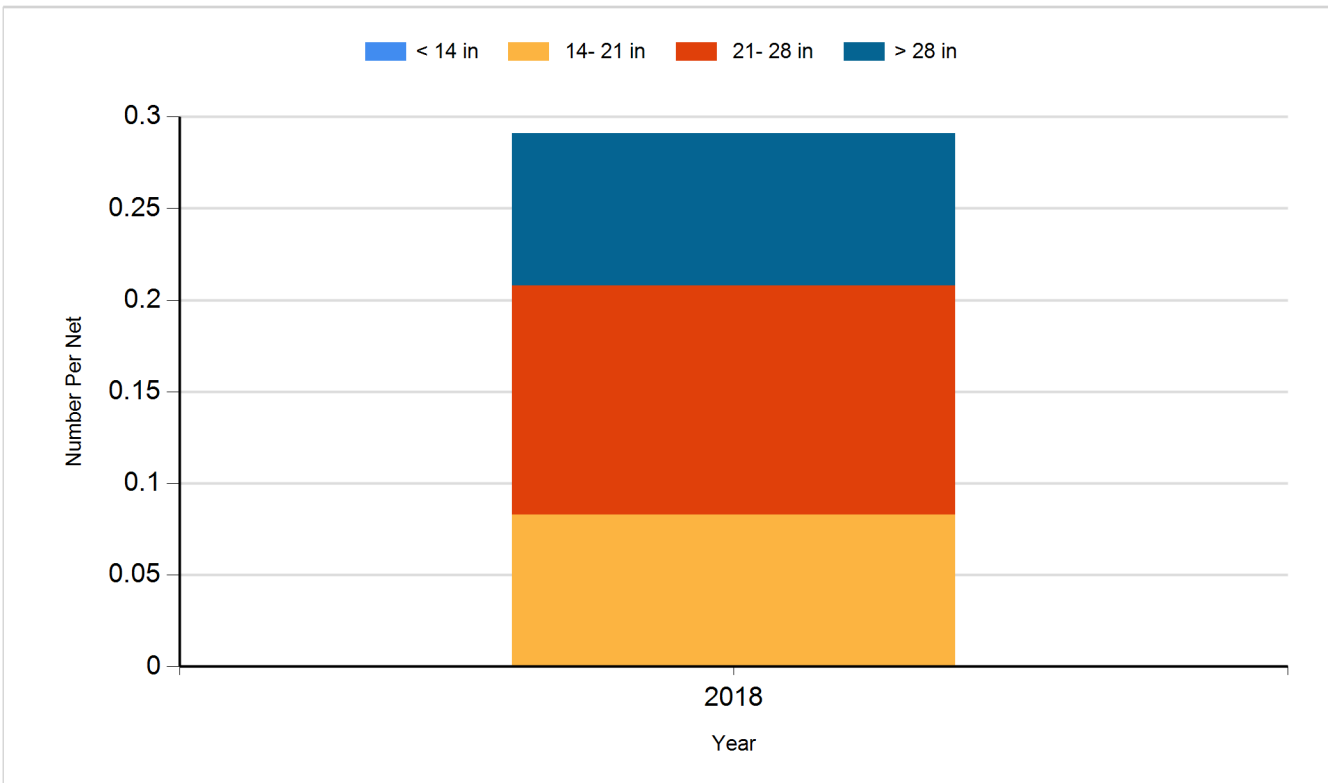
Species: Lake Trout  
Gear: AFS std gill net



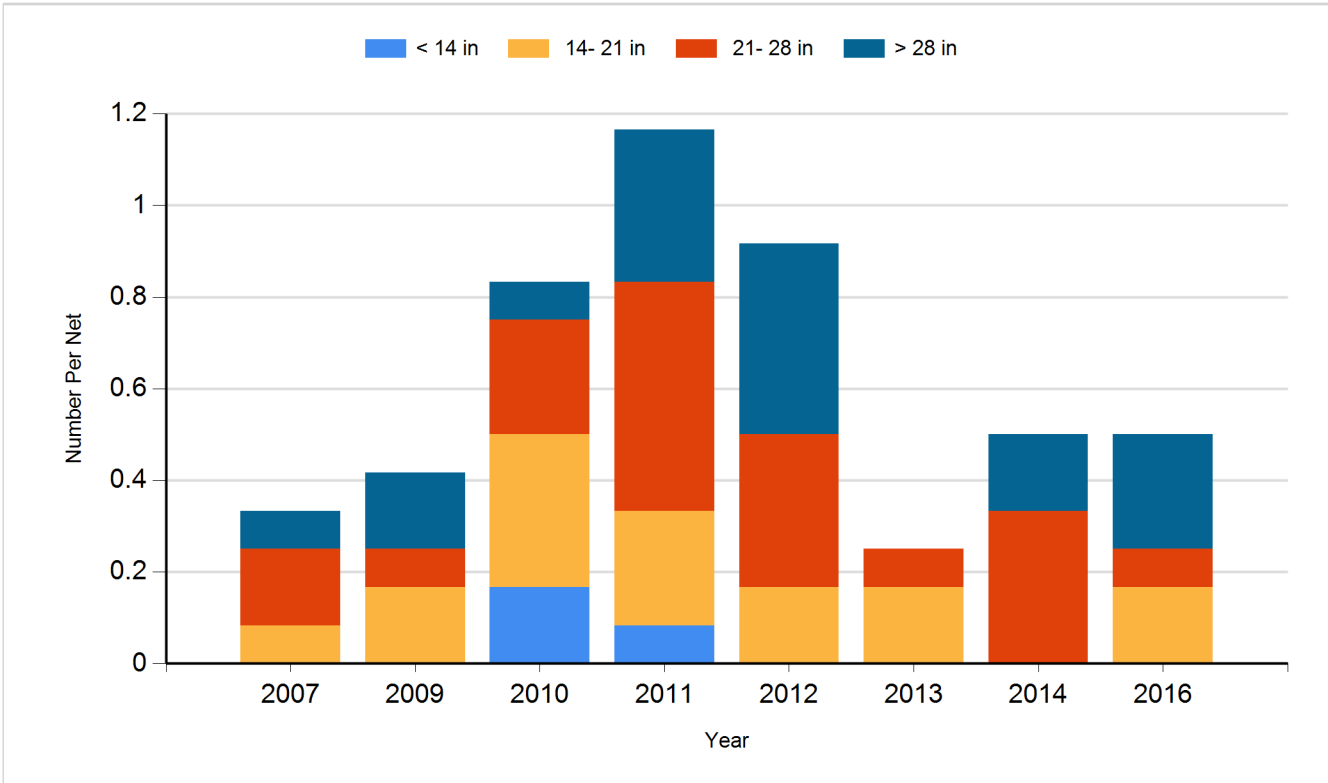
Species: Lake Trout  
Gear: std exp gill net



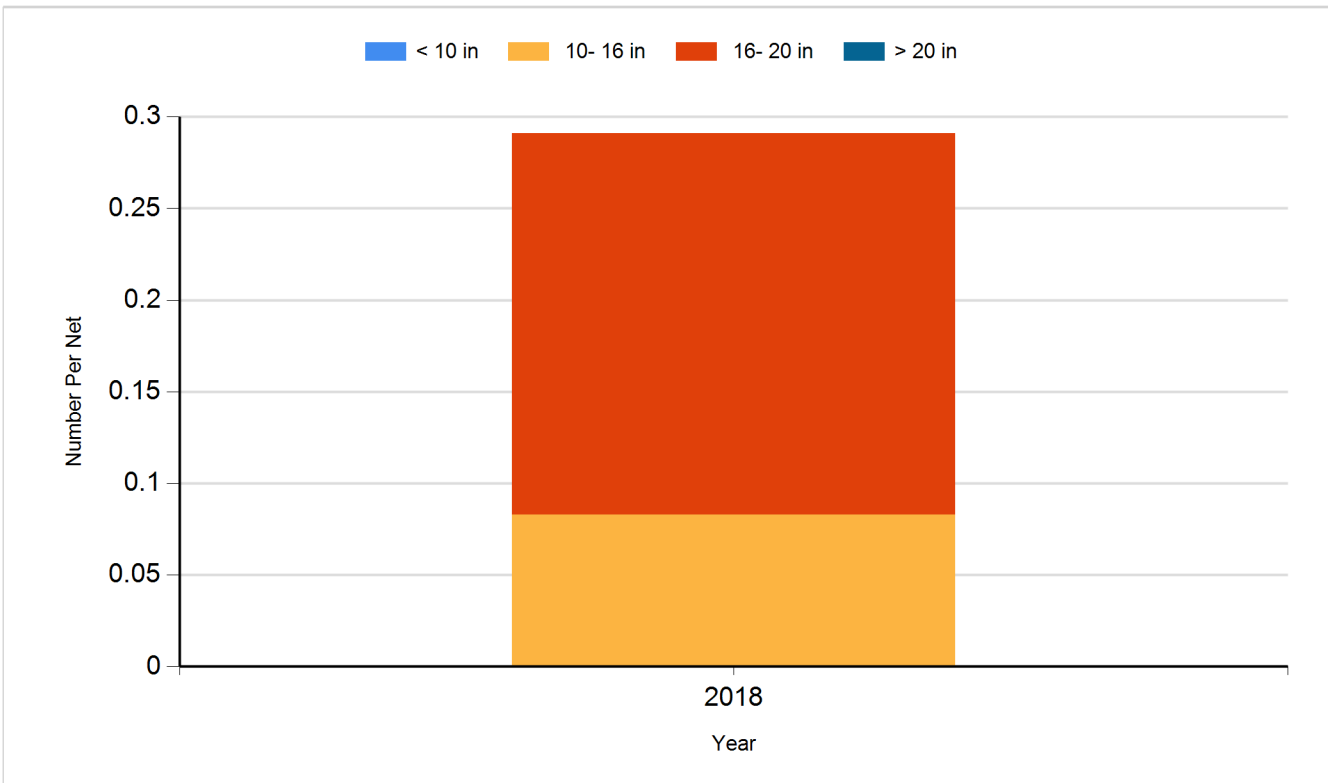
Species: Northern Pike  
Gear: AFS std gill net



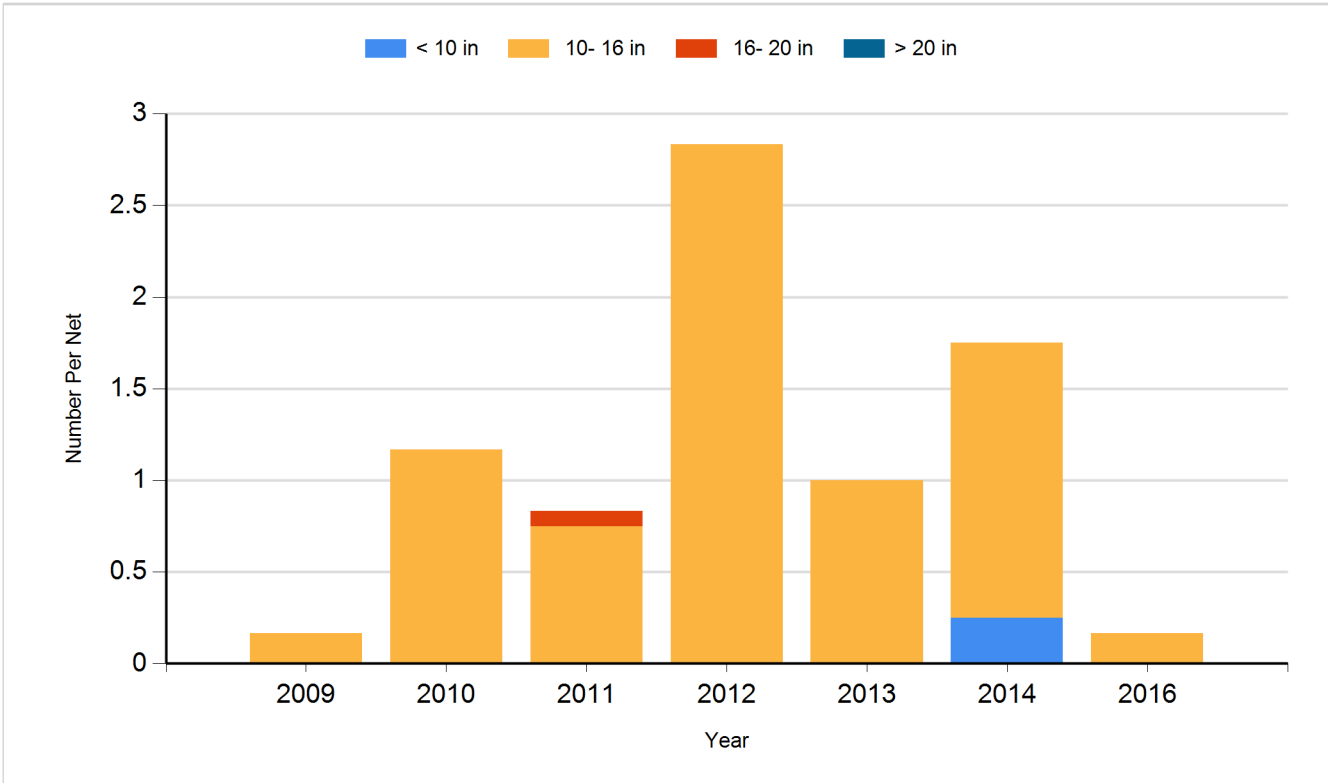
Species: Northern Pike  
Gear: std exp gill net



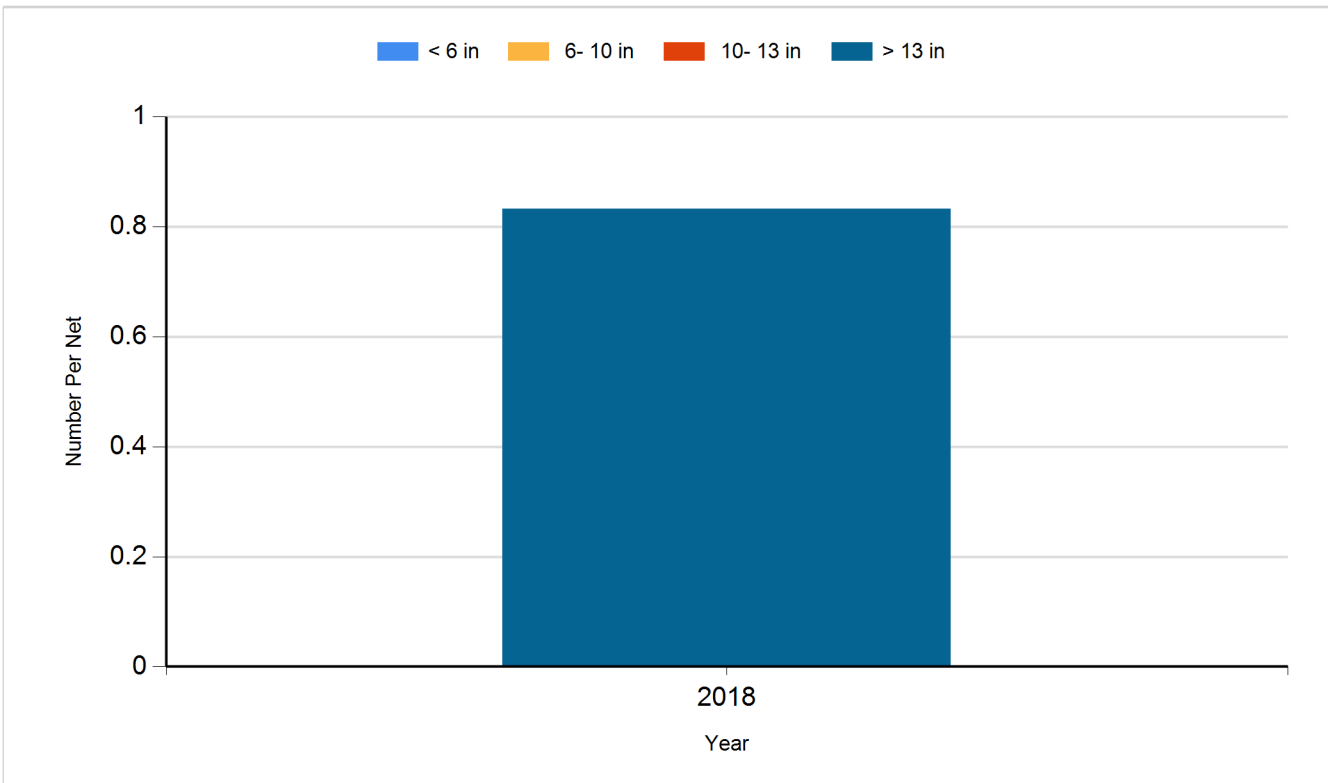
Species: Rainbow Trout  
Gear: AFS std gill net



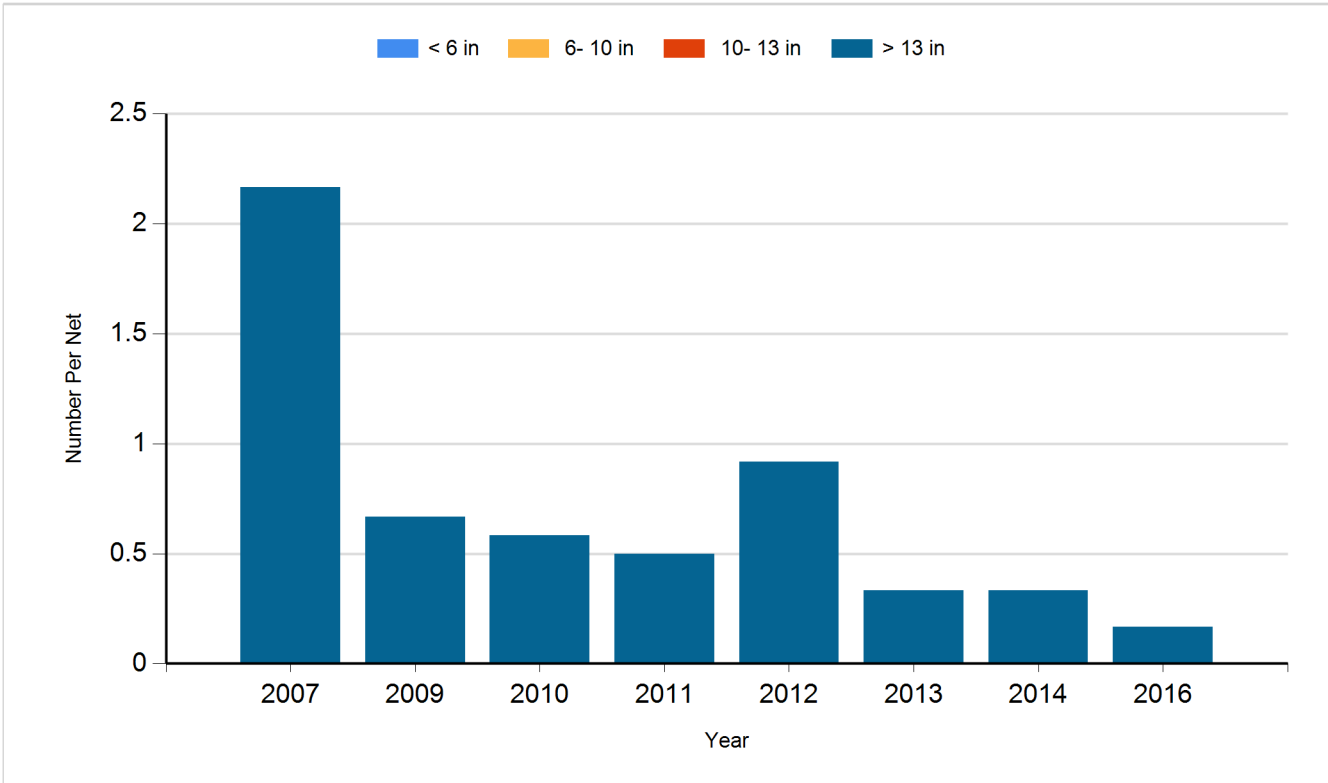
Species: Rainbow Trout  
Gear: std exp gill net



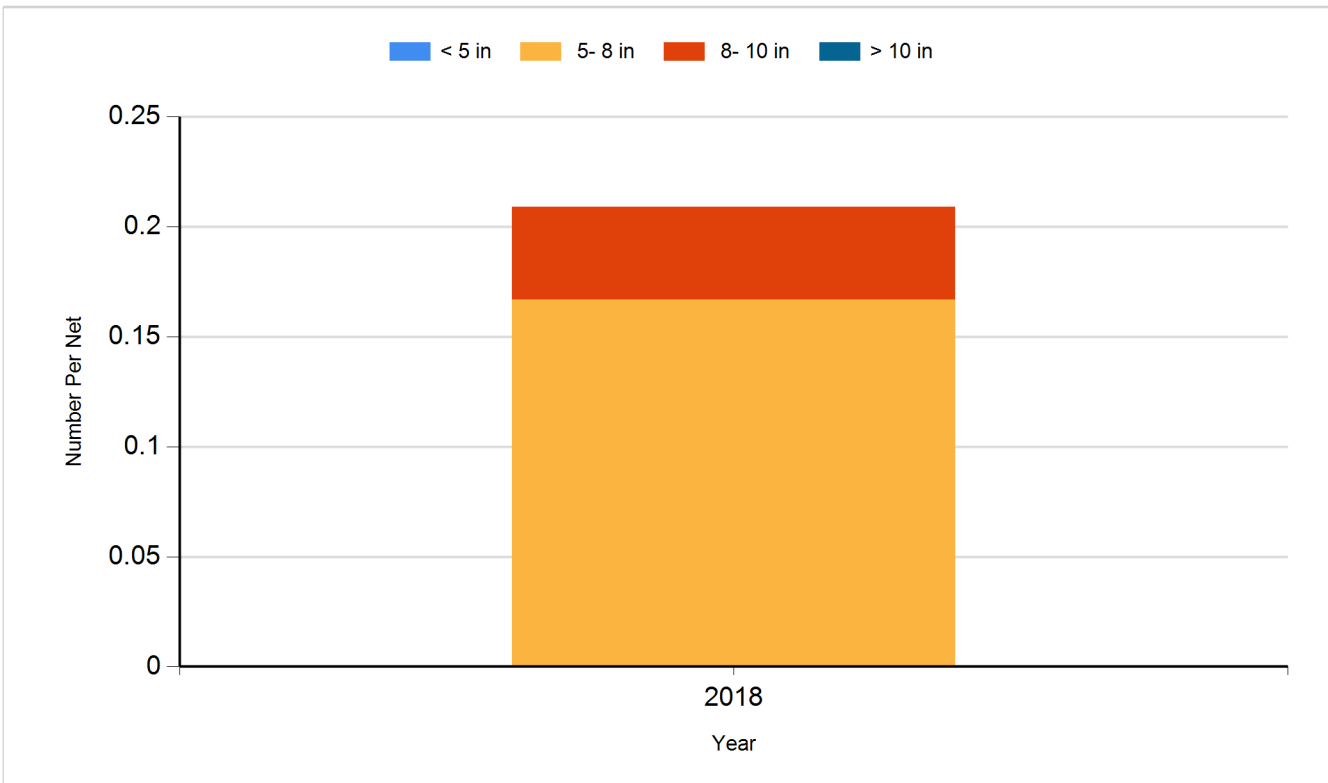
Species: White Sucker  
Gear: AFS std gill net



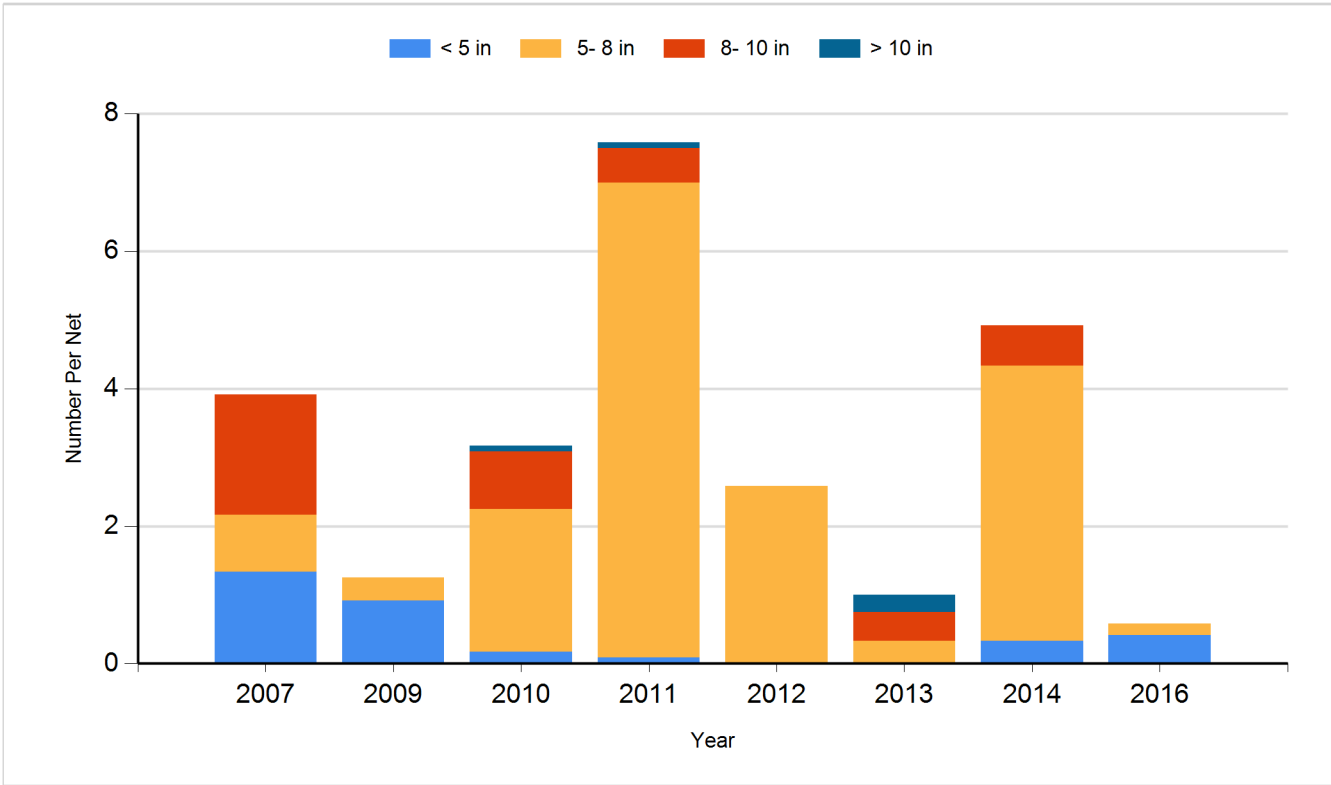
Species: White Sucker  
Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net



Species: Yellow Perch  
Gear: std exp gill net



## **Fish Stocking**

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2007	Brown Trout (Soda Lake)	Catchable	4,700
2007	Rainbow Trout (Erwin)	Catchable	3,000
2007	Rainbow Trout (Shasta)	Catchable 11"	2,800
2008	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	2,125
2008	Rainbow Trout (Shasta)	Catchable 11"	4,963
2008	Rainbow Trout (Utah)	Catchable	7,975
2009	Rainbow Trout (Erwin)	Catchable	3,300
2009	Rainbow Trout (McConaugRainbow Trout)	Catchable	2,400
2009	Rainbow Trout (McConaugRainbow Trout)	Fingerling	7,420
2009	Rainbow Trout (Shasta)	Catchable 11"	22,699
2009	Rainbow Trout (Shasta)	Fingerling	4,603
2009	Rainbow Trout (Shasta)	Small Fingerling	12,420
2010	Rainbow Trout (Erwin x Arlee)	Catchable	9,619
2010	Rainbow Trout (Shasta)	Catchable	14,700
2010	Rainbow Trout (Shasta)	Catchable 11"	4,725
2011	Rainbow Trout (Erwin x Arlee)	Catchable	4,180
2011	Rainbow Trout (Erwin x Arlee)	Catchable 11"	4,725
2011	Rainbow Trout (Shasta)	Catchable	15,112
2011	Rainbow Trout (Shasta)	Catchable 11"	4,725
2012	Rainbow Trout (Erwin x Arlee)	Catchable 11"	9,450
2012	Rainbow Trout (Shasta)	Catchable 11"	19,484
2013	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	12,324
2013	Rainbow Trout (Shasta)	Catchable 11"	17,400
2013	Rainbow Trout (Shasta)	Catchable 15"	129
2014	Rainbow Trout (Erwin x Arlee)	Catchable 11"	880
2014	Rainbow Trout (Erwin x Arlee)	Catchable 15"	354
2014	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	699
2014	Rainbow Trout (Shasta)	Catchable	1,369
2014	Rainbow Trout (Shasta)	Catchable 11"	26,950
2015	Brown Trout	Fingerling	4,000
2015	Lake Trout	Adult	97
2015	Rainbow Trout (Erwin x Arlee)	Catchable 11"	1,356
2015	Rainbow Trout (Erwin x Arlee)	Catchable 15"	206



2015	Rainbow Trout (Erwin x Arlee)	Fingerling	15,236
2015	Rainbow Trout (Shasta)	Catchable 11"	28,727
2016	Brown Trout (Plymouth Rock)	Catchable 11"	8,000
2016	Rainbow Trout (Ennis)	Catchable 11"	9,482
2016	Rainbow Trout (Ennis)	Catchable 15"	3,079
2016	Rainbow Trout (Shasta)	Catchable 11"	9,816
2017	Brown Trout (Plymouth Rock)	Catchable	10,346
2017	Rainbow Trout (Erwin x Arlee)	Catchable 15"	12,337
2017	Rainbow Trout (Shasta)	Catchable 15"	11,415
2018	Brown Trout (Plymouth Rock)	Catchable	3,009
2018	Rainbow Trout (Erwin x Arlee)	Catchable	4,924
2018	Rainbow Trout (Erwin x Arlee)	Catchable 15"	2,622
2018	Rainbow Trout (Erwin x Arlee)	Fingerling	28,579
2018	Rainbow Trout (Shasta)	Catchable	5,131
2018	Rainbow Trout (Shasta)	Catchable 11"	2,800
2018	Rainbow Trout (Shasta)	Catchable 15"	9,694
2018	Rainbow Trout (Shasta)	Juvenile	2,800

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